

20 DEC 2004

518,885

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
31 December 2003 (31.12.2003)

PCT

(10) International Publication Number
WO 2004/000895 A1

- (51) International Patent Classification⁷: **C08F 10/08**, 2/06, 2/42
- (21) International Application Number: PCT/EP2003/006348
- (22) International Filing Date: 17 June 2003 (17.06.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
02077543.3 24 June 2002 (24.06.2002) EP
60/408,196 4 September 2002 (04.09.2002) US
- (71) Applicant (for all designated States except US): **BASELL POLIOLEFINE ITALIA S.P.A.** [IT/IT]; Via Pergolesi, 25, 20124 Milano (IT).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **BIGIAMI, Daniele** [IT/IT]; Via G. Rocchi, 2, I-40137 Bologna (IT). **MEI, Gabriele** [IT/IT]; Via Beata Lucia da Narni, 3, I-44100 Ferrara (IT). **ARICH DE FINETTI, Nicolò** [IT/IT]; Via Borgoleoni, 108, I-44100 Ferrara (IT). **PENZO, Giuseppe** [IT/IT]; Via Segantini, 16, Montanara di Curtatone, I-46010 Mantova (IT). **VITALE, Gianni** [IT/IT]; Via Fulvio Testi, 22, I-44100 Ferrara (IT). **COVEZZI, Massimo** [IT/IT]; Via Renata di Francia, 40, I-44100 Ferrara (IT).
- (74) Agent: **COLUCCI, Giuseppe**; Basell Poliolefine Italia S.p.A., Intellectual Property, P.le G. Donegani, 12, I-44100 Ferrara (IT).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Declaration under Rule 4.17:**
— of inventorship (Rule 4.17(iv)) for US only
- Published:**
— with international search report
— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: LIQUID PHASE PROCESS FOR THE POLYMERIZATION OF ALPHA-OLEFINS

(57) Abstract: A liquid-phase process for polymerizing α -olefins of the formula $\text{CH}_2=\text{CHR}$, where R is H or an alkyl radical C1-C6, to produce a polymer that is soluble in the reaction medium, comprising the steps of: a) continuously polymerizing in liquid phase the α -olefin in the presence of a catalyst system based on a transition metal compound; b) continuously withdrawing from step a) a solution of polymer in the liquid reaction medium; c) mixing in one or more mixing stages said solution of polymer in the reaction medium with an organic deactivator having: at least a hydroxy group, a boiling point higher than 150°C, and a ratio between the molecular weight (MW) and the number of hydroxy groups (OH) comprised between 20 and 100.

WO 2004/000895 A1

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 03/06348

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C08F10/08 C08F2/06 C08F2/42

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C08F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, PAJ, EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 747 612 A (MUHLE MICHAEL ELROY ET AL) 5 May 1998 (1998-05-05)	1
Y	column 5, line 31 - line 44; claims; example 1	1-9
Y	US 4 701 489 A (PELLON BRIAN J ET AL) 20 October 1987 (1987-10-20) cited in the application claims	1-9
Y	EP 0 449 519 A (SHELL OIL CO) 2 October 1991 (1991-10-02) page 5, line 38 - line 39; claims	1-9
Y	EP 0 172 961 A (MITSUI PETROCHEMICAL IND) 5 March 1986 (1986-03-05) page 12, line 17 - line 31 page 21, line 30; claims; examples	1-9
	-/--	

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

Z document member of the same patent family

Date of the actual completion of the international search

29 October 2003

Date of mailing of the international search report

06/11/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-3016

Authorized officer

Kaumann, E

INTERNATIONAL SEARCH REPORT

International Application No

PCT/E 8/06348

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 16 45 282 A (MOBIL OIL CORP) 16 July 1970 (1970-07-16) page 14, line 7 - line 10; claims ----	1-23
A	DE 14 95 070 A (ALLIED CHEM) 16 October 1969 (1969-10-16) claims ----	1-23
Y	EP 0 225 099 A (CHISSO CORP) 10 June 1987 (1987-06-10) cited in the application claims -----	1-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP93/06348

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5747612	A	05-05-1998	US 5442019 A	15-08-1995
			CA 2186400 A1	05-10-1995
			CN 1157000 A	13-08-1997
			DE 69501888 D1	30-04-1998
			DE 69501888 T2	12-11-1998
			EP 0751965 A1	08-01-1997
			ES 2118585 T3	16-09-1998
			JP 2858957 B2	17-02-1999
			JP 9511006 T	04-11-1997
			WO 9526370 A1	05-10-1995
			US 5753786 A	19-05-1998
			US 5672665 A	30-09-1997
US 4701489	A	20-10-1987	AT 91288 T	15-07-1993
			AU 603583 B2	22-11-1990
			AU 7417087 A	10-03-1988
			CA 1312406 C	05-01-1993
			CN 87106011 A , B	06-07-1988
			DE 3786433 D1	12-08-1993
			DE 3786433 T2	28-10-1993
			EP 0259965 A2	16-03-1988
			ES 2056823 T3	16-10-1994
			JP 2074509 C	25-07-1996
			JP 7110887 B	29-11-1995
			JP 63069802 A	29-03-1988
			KR 9506124 B1	09-06-1995
EP 0449519	A	02-10-1991	US 5118757 A	02-06-1992
			AT 137769 T	15-05-1996
			CA 2038974 A1	27-09-1991
			DE 69119285 D1	13-06-1996
			DE 69119285 T2	19-09-1996
			EP 0449519 A2	02-10-1991
			ES 2090241 T3	16-10-1996
			GR 3020679 T3	31-10-1996
			JP 5214007 A	24-08-1993
EP 0172961	A	05-03-1986	EP 0172961 A1	05-03-1986
			AT 38044 T	15-11-1988
			DE 3474673 D1	24-11-1988
DE 1645282	A	16-07-1970	US 3362943 A	09-01-1968
			BE 665478 A	15-12-1965
			CH 456960 A	31-05-1968
			DE 1645282 A1	16-07-1970
			FR 1438707 A	13-05-1966
			GB 1051679 A	
			JP 50015830 B	07-06-1975
			NL 6507563 A , B	16-12-1965
DE 1495070	A	16-10-1969	US 3356666 A	05-12-1967
			BE 652381 A	01-03-1965
			DE 1495070 A1	16-10-1969
			FR 1437392 A	06-05-1966
			GB 1025533 A	14-04-1966
			NL 6409895 A	01-03-1965
EP 0225099	A	10-06-1987	JP 1658346 C	21-04-1992

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 8/06348

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0225099	A	JP 3023090 B	28-03-1991
		JP 62116618 A	28-05-1987
		CA 1287933 C	20-08-1991
		CZ 8608295 A3	15-12-1994
		DE 3683466 D1	27-02-1992
		EP 0225099 A2	10-06-1987
		SK 829586 A3	10-09-1997
		US 4771103 A	13-09-1988
